



03500.014763.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
	:	Examiner: Heather D. Gibbs
SHIGERU KAWASAKI ET AL.)	
	:	Art Unit: 2622
Application No.: 09/655,487)	
	:	
Filed: September 5, 2000)	Conf. No. 8340
	:	
For: IMAGE READING APPARATUS)	July 5, 2006

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBMISSION OF SWORN TRANSLATION OF PRIORITY APPLICATIONS

Sir:

In response to the Office Action dated April 6, 2006, Applicants submit herewith sworn English translations of Japanese Application No. 11-251707, filed September 6, 1999 and Japanese Application No. 11-261065, filed September 14, 1999, from which this application claims priority.^{1/} The filing of this sworn translation removes U.S. Patent 6,631,014 (Aoshima et al.), which has a patent date of October 7, 2003, as a reference against the claims supported by the Japanese priority applications.

All of the pending claims are believed to be patentable for the reasons given in the Remarks section of the Amendment filed on February 9, 2006. Accordingly, Applicants respectfully request favorable reconsideration and early passage to issue of the present

^{1/} Declarations stating that the English translations of Japanese Application Nos. 11-251707 and 11-261065 are accurate are also submitted herewith.

application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

A handwritten signature in cursive script, reading "Jennifer A. Reda".

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DECLARATION

I, TAKAO OCHI, a Japanese Patent Attorney registered No. 10149, of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 11-251707 filed on September 6, 1999 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 16th day of March, 2006

A handwritten signature in black ink, appearing to read 'Takao Ochi', is written over a horizontal line.

TAKAO OCHI

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy
of the following application as filed with this office.

Date of Application: September 6, 1999

Application Number: Japanese Patent Application
No. 11-251707

Applicant(s): CANON KABUSHIKI KAISHA

September 29, 2000

Commissioner,
Patent Office

KOZO OIKAWA

(Seal)

Certificate No. 2000-3079947

11-251707

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[Reference No.] 4051033

[Date] September 6, 1999

[Addressed to] Commissioner of the
Patent Office
TAKAHIKO KONDO

[International Classification] H04N 1/04

H04N 1/12

[Title of the Invention] Image Reading Apparatus

[Number of the Claims] 5

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[Prepayment Ledger No.] 066073

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[List of Filed Materials]

[Material] Specification 1

[Material] Drawings 1

[Material] Abstract 1

[General Power of Attorney] 9703880

[Proof requirement] necessary

11-251707

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2000-3079947

CFO14763

11-251707

[Name of the Document] Specification

[Title of the Invention] Image Reading Apparatus

5 [Claim(s)]

[Claim 1] An image reading apparatus comprising:
a scanning member for scanning along a transparent
member; and

a guide member for guiding said scanning member,
10 wherein said guide member is provided in a
position where the total sum of moments working on the
scanning member becomes substantially zero.

[Claim 2] An image reading apparatus according to
claim 2, wherein said scanning member further
15 comprising:

a reading unit for reading an original image via
said transparent member;
a drive source for providing the driving force;
a biasing member for biasing said reading unit to
20 the transparent member; and
a control signal path to be connected to said
scanning member.

[Claim 3] An image reading apparatus according to
claim 2, wherein said moment includes moments generated
25 by said reading unit, said drive source, said biasing
member, and said control signal path.

[Claim 4] An image reading apparatus according to

claim 1, 2 or 3, wherein power consumption required to operate said scanning member is within 2.5 W.

[Claim 5] An image reading apparatus according to claim 4, wherein said image reading apparatus is
5 connected to external equipment by a USB interface, and power is supplied from the external equipment via said USB interface.

[Detailed Description of the Invention]

[0001]

10 [Field of the Invention]

The present invention relates to an image reading apparatus capable of reading an original such as a text or a photograph, executing conversion into digital data and outputting the obtained image data, and adapted for
15 use for computer input.

[0002]

[Prior Art]

Schematic configurations of a color image reading apparatus are shown in Figs. 4 and 5.

20 [0003]

As shown in Fig. 4, an original P is placed on an original mounting glass 100 as a transparent member and an original cover 112 is then closed to press the original P to the original mounting glass 100. Then a
25 reading unit now shown in a frame member 111 performs a scanning motion parallel to the original mounting glass 100 to read the image on the original P.

[0004]

Fig. 5 is a perspective view of a state without an upper part thereof such as an original mounting glass 100 etc.

5 [0005]

A frame member 111 serving as an external cover contains following components therein. The reading unit 101 is provided therein with LED's of three colors (R, G and B) constituting light sources for
10 illuminating the original, an image sensor and a rod lens array for focusing the light reflected from the original P illuminated by the light sources onto the photosensor elements of the image sensor. The light sources of three colors are turned on in succession and
15 the image sensor reads the light of respective color reflected from the original P to execute color-separated image reading.

[0006]

The reading unit 1 is provided on a holder 107
20 which is equipped with a slider 102 and is slidably supported on a guide shaft 103 fixed to a side of a frame member 111. The holder 107 is provided with a motor 105 constituting a drive source for moving the reading unit 101 along the guide shaft 103.

25 [0007]

The frame member 111 incorporates a transmission mechanism such as for transmitting the driving force of

the motor 105 to the holder 107, that is the reading unit 101. The synchronized meshing wire 104 is fixed at an end thereof to the frame member 111 and is supported, at a predetermined tension, at the other end
5 by an unrepresented biasing member.

[0008]

The driving force of the motor 105 is transmitted through speed changing means 108 to a synchronized meshing pulley not shown positioned at the rear side of
10 the holder 107 and constituting drive speed changing means. The synchronized meshing pulley is so constructed as to maintain synchronized meshing with the synchronized meshing wire 104.

[0009]

15 Thus, in response to the forward or reverse rotation of the motor 105, the synchronized meshing pulley executes forward or reverse rotation whereby the reading unit 101 executes reciprocating motion parallel to the unrepresented original mounting glass.

20 [0010]

In the frame member 111, there is also provided a control board 106 which is connected to a flat cable 109 constituting a control signal path for the reading unit 101 and the motor 105.

25 [0011]

[Problem to be Solved by the Invention]

In the case of the above-described conventional

technology however, the guide shaft 103, which is guide means of the scanning member (constructed with the reading unit 101, motor 105, holder 107, speed changing means 108 etc.) is provided at one edge of the scanning member unevenly, so there is a case where the scanning member does not move smoothly at that movement and behaves unnaturally, having negative impact on quality of an image read.

[0012]

10 Especially, during intermittent reading caused by waiting for the processing of external equipment, such as personal computer, when the scanning member repeats stop and start, quality of an image read is deteriorated more seriously.

15 [0013]

 The present invention has been obtained to solve the above-mentioned problem in the prior art, and an object of the present invention is to provide an image reading apparatus which constantly maintains the balance of the scanning member and always obtains high quality image read.

[0014]

[Means for Solving the Problem]

 In order to achieve the above-mentioned object, an image reading apparatus comprises a scanning member for scanning along a transparent member, and a guide member for guiding the scanning member, wherein the guide

member is provided in a position where the total sum of moments working on the scanning member becomes substantially zero.

[0015]

5 It is preferable that the scanning member further comprises a reading unit for reading an original image via the transparent member, a drive source for providing the driving force, a biasing member for biasing the reading unit to the transparent member, and
10 a control signal path to be connected to the scanning member.

[0016]

 It is preferable that the moment includes moments generated by the reading unit, the drive source, the
15 biasing member, and the control signal path.

[0017]

 It is preferable that power consumption required to operate said scanning member is within 2.5 W.

[0018]

20 It is preferable that the image reading apparatus is connected to external equipment by a USB interface, and power is supplied from the external equipment via the USB interface.

[0019]

25 [Embodiment(s)]

 The present invention will be clarified in detail by a preferred embodiment thereof, with reference to

the accompanying drawings. However, the dimension,
material, shape, relative arrangement etc. of the
components in such embodiments are intended to limit
the scope of the present invention unless otherwise
5 specified.

[0020]

[First embodiment]

At first there will be explained a first
embodiment, with reference to Figs. 1 to 3. Fig. 1 is
10 a perspective view of the image reading apparatus of
the present invention, in a state without an upper part
thereof such as an original mounting glass, which is a
transparent member, etc.

[0021]

15 A frame member 11 serving as an external cover
contains following components therein. A reading unit
1 is provided therein with LED's of three colors (R, G
and B) constituting light sources for illuminating the
original, a rod lens array for focusing the light
20 reflected from the original onto the photosensor
element of the image sensor, and an image sensor. The
light sources of three colors are turned on in
succession and the image sensor reads the light of
respective color reflected from the original P to
25 execute color-separated image reading.

[0022]

The reading unit 1 is provided on a holder 7 which

is equipped with a slider 2 and is slidably supported on a guide shaft 3 fixed to a frame member 11. The holder 7 is provided with a motor 5 constituting a drive source for moving the reading unit 1 along the guide shaft 3.

[0023]

The frame member 11 incorporates a transmission mechanism for transmitting the driving force of the motor 5 to the holder 7 and the reading unit 1. The synchronized meshing wire 4 is fixed at an end thereof to the frame member 11 and is supported, at a predetermined tension, at the other end by an unrepresented biasing member.

[0024]

The driving force of the motor 5 is transmitted through speed changing means 8 to a synchronized meshing pulley 14 (cf. Fig. 2) positioned at the rear side of the holder 7. The synchronized meshing pulley 14 is so constructed as to maintain synchronized meshing with the synchronized meshing wire 4. Thus, in response to the forward or reverse rotation of the motor 5, the synchronized meshing pulley 14 executes forward or reverse rotation whereby the reading unit 1 executes reciprocating motion parallel to the unrepresented original mounting glass.

[0025]

In the frame member 11, there is also provided a

control board 6 which is connected to a flat cable 9 constituting a control signal path for the reading unit 1 and the motor 5.

[0026]

5 Fig. 2 shows exploded perspective views showing the reading unit 1 and the holder 7.

[0027]

 The holder 7 is provided with the aforementioned motor 5, speed changing means 8, synchronized meshing
10 pulley 14 and slider 2.

[0028]

 The reading unit 1 is provided, across a biasing member 13 such as a spring, on the holder 7. On both
15 ends of the reading unit 1 in the longitudinal direction thereof there are provided spacers 12 of a material of a low friction coefficient.

[0029]

 The flat cable 9 constituting the control signal path is positioned between the holder 7 and the reading
20 unit 1.

[0030]

 The flat cable 9 is connected at an end C thereof to the control board 6 but is branched at the other end on the holder 7, and a branched end S is connected to
25 the reading unit 1 including the sensor while the other branched end M is connected to the motor 5.

[0031]

A portion of the flat cable 9 connected to the control board 6 is preferably positioned as close as possible to the guide shaft 3 (in the longitudinal direction of the reading unit 1) in order to reduce the influence of the moment to the guide shaft 3.

[0032]

Thus the reading unit 1 executes the scanning movement parallel to the original mounting glass while maintaining a state of a light contact thereto by the spacers 12, thereby reading the image on the original.

[0033]

Fig. 3 is a functional block diagram of the image reading apparatus. In Fig. 3, a chain-lined frame 15 is a portion corresponding to the scanning member described above, and a broken-lined frame indicates the aforementioned control board 6.

[0034]

The image reading apparatus functions by the basic functional blocks in the following manner. A control portion 26 drives motor drive means 27 and image sensor drive means 17. The image sensor drive means 17 activates the unrepresented three-color LED's in turn, thereby causing to execute photoelectric conversion of the light reflected from the original and to accumulate the corresponding charges.

[0035]

The image sensor, image sensor drive means 17 and

three-color LED's are constructed a part of the reading unit.

[0036]

5 A motor 5 moves the reading unit 1 in the sub scanning direction. The output signal of the image sensor 16 is amplified by an amplifier 21 and then converted into a digital image signal by an A/D converter 22.

[0037]

10 The image signal digitized by the A/D converter 22 is subjected, in image processing means 23, to image processing such as shading correction utilizing shading data stored in a RAM 25, digital gain control and digital black correction.

15 [0038]

Thereafter the digital image signal is stored in a line buffer 24 and is transferred, through an interface, to an external equipment such as a personal computer (PC).

20 [0039]

All these operations are executed by a control portion 26 which controls the various functional blocks based on instructions from driver means of an external equipment.

25 [0040]

The above-described image reading apparatus involves various moments on the guide shaft 3

constituting guide means for guiding the movement of the scanning member composed of the reading unit 1, slider 2, motor 5, holder 7, speed changing means 8, flat cable 9, synchronized meshing pulley 14 etc.

5 [0041]

More specifically, a moment is generated by the holder 7 and the reading unit 1, slider 2, motor 5, speed changing means 8, flat cable 9, synchronized meshing pulley 14 etc. supported thereon, and another
10 moment is generated by the action force of a biasing member 13 such as a spring provided between the reading unit 1 and the holder 7.

[0042]

In the image reading apparatus of the present
15 invention, the guide shaft 3 constituting the guide means for guiding the movement of the scanning member is provided in a position where the total sum of the aforementioned moments acting on the scanning member becomes approximately zero.

20 [0043]

More specifically, the guide shaft 3 is provided in such a position as to maintain a very small difference between the biasing forces of the scanning member to the original mounting glass at both ends of
25 the scanning member in the longitudinal direction thereof, whereby the scanning member supported by the guide shaft 3 is always well balanced.

[0044]

In the conventional configuration, the biasing forces of the scanning member to the original mounting glass are extremely different at both ends of the scanning member in the longitudinal direction so that the smooth scanning movement cannot be realized. In the present invention, the difference of such biasing forces at both ends of the scanning member in the longitudinal direction is made extremely small so that the scanning movement can be made smooth.

[0045]

As the above-described configuration is free from unnecessary force on the scanning movement, it is rendered possible to constantly maintain the scanning member in the balanced state thereby always providing the image reading of high quality and also to minimize the driving force for the scanning member, thereby reducing the electric power consumption of the apparatus.

[0046]

In the combination with the reading unit explained in the embodiment of the present invention, the electric power consumption of the entire image reading apparatus in the driven state can be suppressed to 2.5 W or lower.

[0047]

Such electric power of 2.5 w or lower can be

supplied to the peripheral equipment from the USB interface which is rapidly becoming popular in the personal computers (PC), so that the image reading apparatus of the present invention, equipped with the
5 USB interface, does not required a power supply unit as necessitated in the conventional products but can be operated by mere connection to the personal computer (PC).

[0048]

10 [Effect of the Invention]

As described so far, in the present invention, since unnecessary force is not acted when the scanning member makes a scan movement and the balance of the scanning member is maintained constantly so that high
15 quality image read is always obtainable.

[Brief Description of the Drawings]

[Fig. 1] A perspective view of an image reading apparatus constituting an embodiment.

[Fig. 2] An exploded perspective view showing a
20 reading unit and a holder in the embodiment of the image reading apparatus.

[Fig. 3] A functional block diagram of the embodiment of the image reading apparatus.

[Fig. 4] An overall perspective view showing an
25 image reading apparatus of the prior art.

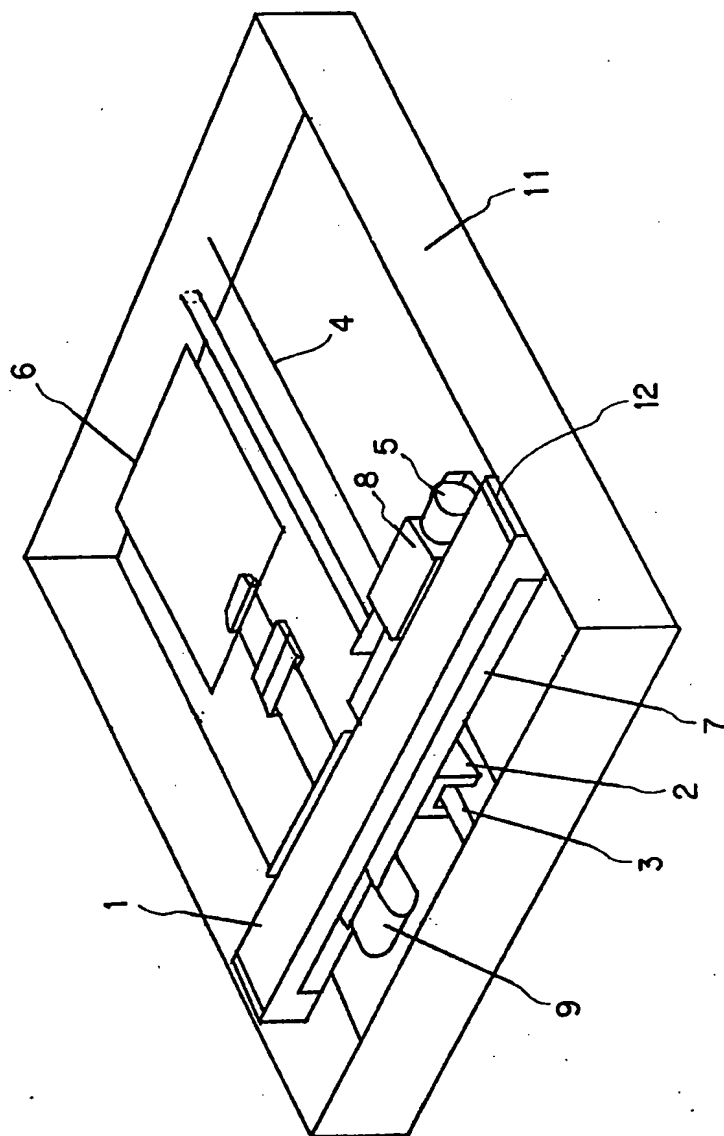
[Fig. 5] A perspective view showing the image reading apparatus of the prior art.

[Description of Reference Numerals or Symbols]

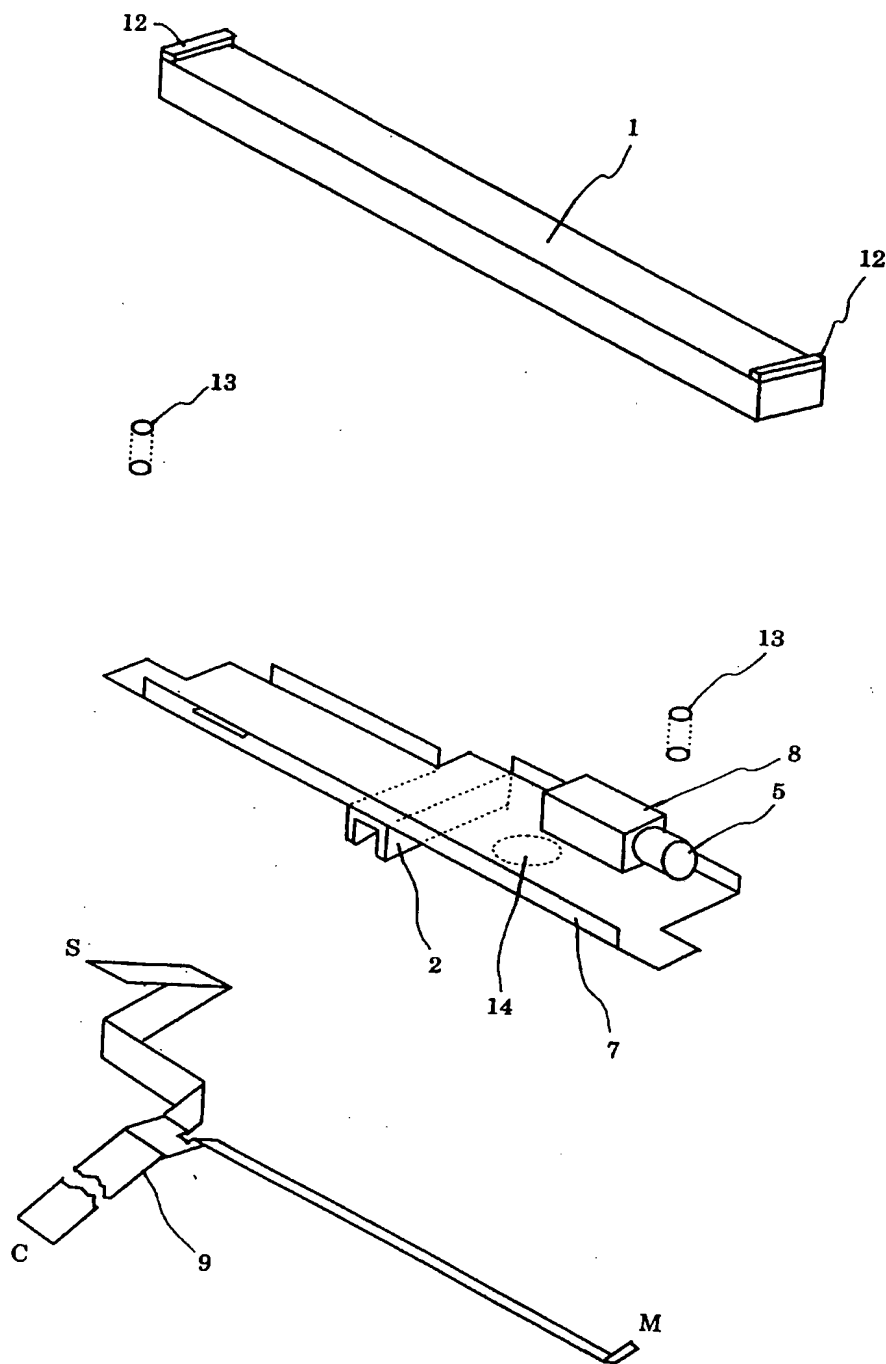
- | | | |
|----|----|-----------------------------|
| | 1 | Reading unit |
| | 2 | Slider |
| | 3 | Guide shaft |
| 5 | 4 | Synchronized meshing wire |
| | 5 | Motor |
| | 6 | Control board |
| | 7 | Holder |
| | 8 | Speed changing means |
| 10 | 9 | Flat cable |
| | 11 | Frame member |
| | 12 | Spacer |
| | 13 | Biasing member |
| | 14 | Synchronized meshing pulley |
| 15 | 17 | Image sensor drive means |
| | 21 | Amplifier |
| | 22 | A/D converter |
| | 23 | Image processing means |
| | 24 | Line buffer |
| 20 | 25 | RAM |
| | 26 | Control portion |
| | 27 | Motor drive means |

【書類名】 図面 (Name of the Document) Drawings

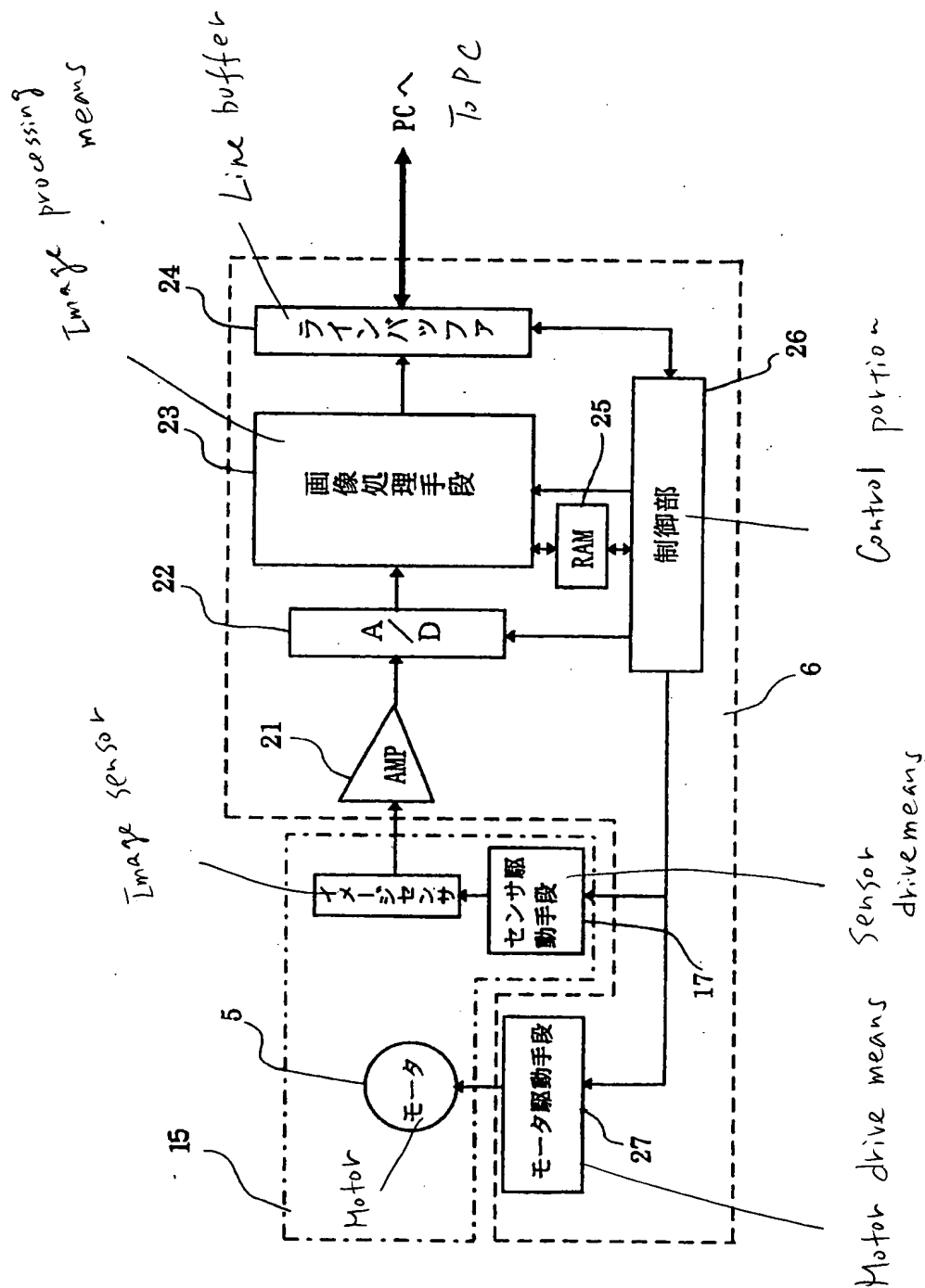
【図1】 Fig. 1



【図2】 Fig. 2

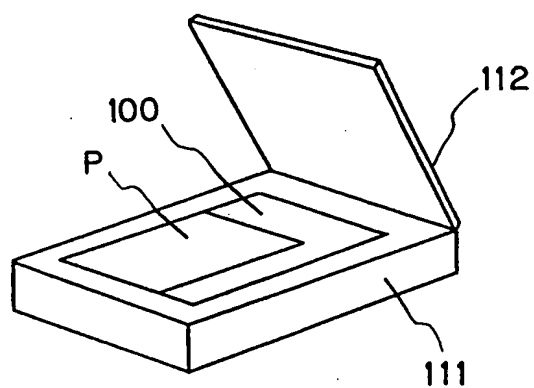


【図3】 Fig. 3

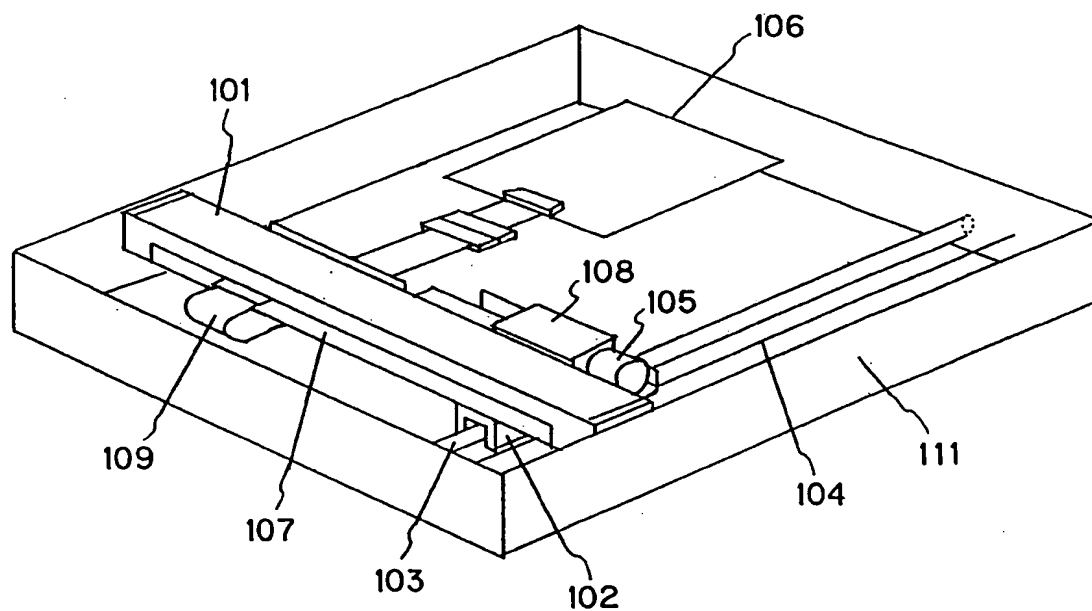


【図4】

Fig. 4



【図5】 Fig.5



[Name of the Document] Abstract

[Abstract]

[Problem(s)] An object of the present invention is to provide an image reading apparatus which constantly
5 maintains the balance of the scanning member and always obtains high quality image read.

[Means for Solving the Problem(s)] A guide shaft 3 for guiding the movement of the scanning member is provided in a position where the total sum of moments working on
10 the scanning member generated by the holder 7 and the reading unit 1, slider 2, motor 5, speed changing means 8, flat cable 9, synchronized meshing pulley 14 etc. supported thereon, and another moment generated by the action force of a biasing member 13 such as a spring
15 provided between the reading unit 1 and the holder 7 becomes substantially zero.

[Elected Drawing] Fig. 1